

CLAIMS

1. Machine for manufacturing a continuous strip of metal lattice by means of a single wire of flexible metal supplying said machine continuously, said lattice being produced by repeating a same motif of metal wire in a plane, each motif being superposed on the preceding motif with an offset of constant pitch in the axial direction in which the strip of lattice is produced, characterised in that the machine comprises:

- a stage at which the metal wire is stored;
- a stage at which the machine is continuously supplied with metal wire;
- a shaping stage at which said wire is configured in a succession of identical motifs;
- a transfer stage for displacing each motif of metal wire successively towards the plane at which the strip of lattice is formed;
- a stage at which each motif is retained in a plane and offset at a constant pitch before the subsequent motif arrives;
- a stage at which the motifs are affixed to one another.

2. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that it has a device for cutting the strip of lattice disposed downstream of the means for affixing the motifs to one another.

3. Machine for manufacturing a continuous strip of lattice as claimed in one of the preceding claims, characterised in that the stage at which the flexible

metal wire is stored consists of a reel of wire freely rotating in a support of said reel.

4. Machine for manufacturing a continuous strip of lattice as claimed in any one of the preceding claims, characterised in that the stage for supplying the machine with metal wire comprises, in succession:

- means for straightening the wire, designed to place it in a straight line,
- at least one pulley for guiding the wire towards
- a rotary device for winding around a drum.

5. Machine for manufacturing a continuous strip of lattice as claimed in any one of the preceding claims, characterised in that the shaping stage comprises a shaping drum, retained in a fixed arrangement during the shaping process, around which the metal wire is wound.

6. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that the shaping stage is pivotable relative to the shaping axis.

7. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that means for constraining the wire so that it conforms to the shape of said drum are provided at the periphery of the latter and the movement of said means is synchronised with the winding movement of the wire.

8. Machine for manufacturing a continuous strip of lattice as claimed in any one of claims 5 to 7, characterised in that the stage at which each motif of

the lattice is transferred consists of an unreeling drum, coaxial with the shaping drum, equipped with helical worms, and actuated by a rotating movement synchronised with the winding speed of the wire, which enables the turns forming the motifs of the lattice to be separated.

9. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that devices enabling each turn to be deposited on the shaping plane of the lattice are disposed on the periphery of the unreeling drum, on a level with its end remote from the shaping drum, and the movement of these devices is synchronised with that of said unreeling drum.

10. Machine for manufacturing a continuous strip of lattice as claimed in any one of the preceding claims, characterised in that the stage for retaining each motif in the shaping plane of the lattice and for offsetting it at a constant pitch before the subsequent motif arrives in said plane consists of a plurality of endless belts disposed parallel, driven at the same speed, which is synchronised with the speed at which the motifs of metal wire are shaped, and said belts have teeth at regular intervals enabling each motive deposited on the plane which they form to be driven.

11. Machine for manufacturing a continuous strip of lattice as claimed in any one of the preceding claims, characterised in that the means for affixing the motifs of metal wire to one another comprise at least one welding bridge disposed transversely to the axis along which the lattice is fed.

12. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that at least one welding bridge applies a weld in the vertical direction and is preceded by a device which enables motifs sharing a same cross-section to be retained in contact with one another.

13. Machine for manufacturing a continuous strip of lattice as claimed in claim 11, characterised in that at least one welding bridge applies a weld in the horizontal direction.

14. Machine for manufacturing a continuous strip of lattice as claimed in any one of claims 4 to 13, characterised in that the winding device comprises a hollow rotating shaft through which the wire passes after being guided by means of at least one pulley orienting said wire towards said shaft, the outlet of which is equipped with a pulley re-orienting the wire in a radial direction towards an external winding pulley, the axis of which subtends an acute angle with the axis of rotation of the winding device, the circular displacement of which has a bigger radius than that of the winding drum.

15. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that said winding device is driven by an electric motor.

16. Machine for manufacturing a continuous strip of lattice as claimed in any one of claims 14 and 15, characterised in that the shaping drum is disposed coaxially with the winding device, in the extension of

the hollow shaft.

17. Machine for manufacturing a continuous strip of lattice as claimed in one of claims 5 to 16, characterised in that radial spring-biased rams hold the wire wound around the shaping drum.

18. Machine for manufacturing a continuous strip of lattice as claimed in one of claims 5 to 17, characterised in that if the drum has at least one indented and/or concave surface, a corresponding number of devices designed to apply the wire against said surface or surfaces is provided at the periphery of said drum, and the movement of this or these devices(s) is synchronised with the speed transmitted by the winding motor.

19. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that the device designed to apply the wire against a concave surface causing it to assume the shape of an indented arc comprises a rotating element with an axis of rotation parallel with the axis of the drum, equipped with a wing perpendicular to said axis, the external edge of which is provided with means for guiding the metal wire, and has the contour of a section conforming to the shape of the concave surface.

20. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that said wing comprises two sections, a first section with an elliptical external edge provided with at least one guide roller for the metal wire, and a second section

with a contour continuing from the first forming an arc of a circle and having a lateral edge parallel with the axis of rotation, provided with a guide groove, and the element for positioning the wire is rotated so that the elliptical section penetrates the concave shape of the drum first.

21. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that the guide rollers with an elliptical section are provided in a plurality distributed across its edge, and a roller with a bigger diameter is fitted on the end of said section penetrating the concave shape first.

22. Machine for manufacturing a continuous strip of lattice as claimed in claim 18, characterised in that the device designed to apply the wire in an indentation of the wall of the drum comprises a ram, the detachable head of which has a shape which can be inserted in said indentation, said head being mobile in translation, and the displacement is programmed so that it is synchronised with the winding speed.

23. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that the ram is controlled by a motor actuating a rack via a gear mounted on the shaft, at the end of which the head is affixed.

24. Machine for manufacturing a continuous strip of lattice as claimed in claim 22, characterised in that the ram is actuated by a piston or a linear motor.

25. Machine for manufacturing a continuous strip of lattice as claimed in any one of claims 8 to 24, characterised in that at least one guide device for axially fixing the turns forming the motifs of the lattice is placed along and in the extension of the unreeling drum, said guiding action being afforded by means of at least one internal guide disposed facing an external guide, each pair of guides bounding a passage conforming to the shape of each turn and disposed as a function of worms of the unreeling drum, in at least one point where the motif has a projection towards the exterior.

26. Machine for manufacturing a continuous strip of lattice as claimed in any one of claims 9 to 25, characterised in that the devices enabling the unreeled turns to be deposited on the shaping plane of the lattice comprises endless screw shafts disposed at regular intervals at the periphery and in the axial extension of the unreeling drum, said shafts being driven by electric motors synchronised so that they are actuated individually or in groups, namely in succession, and enable one turn forming a motif of the lattice to be extracted after the other.

27. Machine for manufacturing a continuous strip of lattice as claimed in any one of claims 10 to 26, characterised in that the shaping plane of the lattice obtained by successively offsetting the motifs comprises a central chain and two lateral chains, equipped with teeth for driving the motifs, said chains being driven by motors synchronised with each other and with the motors of the endless screw devices.

28. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that said chains have a guide strip and a fixed rigid guard mounted above them.

29. Machine for manufacturing a continuous strip of lattice as claimed in any one of claims 27 and 28, characterised in that slide plates are disposed underneath the lattice at the ends of the chains, which are distal with respect to the system of manufacturing the motifs of said lattice.

30. Machine for manufacturing a continuous strip of lattice as claimed in any one of claims 11 to 29, characterised in that there are two transverse welding bridges operating in a vertical direction, each preceded by a bridge for retaining the motifs forming the lattice, each bridge being equipped with two heads disposed on either side of the lattice, each applying an action in the direction of the other head.

31. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that said heads of the retaining bridges are detachable and have male and female relief areas respectively which depend on the motifs forming the lattice and enable an inter-penetration in order to place said motifs in contact with one another in readiness for welding.

32. Machine for manufacturing a continuous strip of lattice as claimed in one of claims 30 and 31,

characterised in that the welding bridges apply a spot weld to at least some of the intersections of the motifs in a transverse direction, two times, corresponding to two transverse patterns of intersection of the motifs forming the lattice.

33. Machine for manufacturing a continuous strip of lattice as claimed in any one of claims 11 to 29, characterised in that it has a welding bridge operating in a horizontal direction by means of at least a pair of extractable heads which can be inserted in the two successive meshes of the lattice in the direction in which the latter is fed.

34. Machine for manufacturing a continuous strip of lattice as claimed in one of claims 27 to 33, characterised in that the lateral chains extend as far as the first welding bridge, whereas the central chain extends as far as the second welding bridge.

35. Machine for manufacturing a continuous strip of lattice as claimed in any one of claims 5 to 29, characterised in that the shaping drum has a main body, to which at least one additional volume designed to modify a portion of its external shaping wall can be fixed.

36. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that the additional volume is configured so that it is inserted in at least a portion of concave surface of the wall of the drum in order to define a new portion of flat or convex wall.

37. Machine for manufacturing a continuous strip of lattice as claimed in claim 35, characterised in that the additional volume is configured so that it is inserted in at least one portion of concave surface of the wall of the drum in order to define a new portion of wall incorporating an indentation.

38. Machine for manufacturing a continuous strip of lattice as claimed in any one of claims 10 to 37, characterised in that it has at least one reel of wire disposed to the side of the shaping plane of the lattice, the wire being directed towards a face of the strip of lattice and re-oriented during feeding so as to be parallel with said feed direction, then fixed to the strip of lattice.

39. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that the reels are two or four in number, in which case the wires are directed respectively to one or the two faces of the strip of lattice.

40. Machine for manufacturing a continuous strip of lattice as claimed in any one of the preceding claims, characterised in that it has a stage for axially shaping at least a transverse portion of the strip of lattice on a continuous basis.

41. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that the shaping is effected along two transverse portions alongside the borders of the strip of lattice.

42. Machine for manufacturing a continuous strip of lattice as claimed in any one of the preceding claims, characterised in that it has a central electronic unit for managing the machine, the parameters of which can be controlled by means of peripheral devices accessible to the user, and said central unit processes the signals emitted by sensors indicating the instantaneous state of certain moving components of the machine.

43. Machine for manufacturing a continuous strip of lattice as claimed in the preceding claim, characterised in that said peripheral devices accessible to the user comprise a monitor and a keyboard.

44. Machine for manufacturing a continuous strip of lattice as claimed in one of claims 42 and 43, characterised in that said central unit and peripheral devices form part of a micro-computer containing a programme for managing the machine.

45. Machine for manufacturing a continuous strip of lattice as claimed in one of claims 42 to 44, characterised in that the sensors are applied to the various motors of the machine and provide information about their position and their speed at any instant.

46. Strip of lattice manufactured with the aid of a machine as claimed in the preceding claims, characterised in that it is made by repeating a single motif offset along the axis in which said strip is produced and said motifs are welded to one another on a level with at least some of their intersections.

47. Strip of lattice as claimed in the preceding claim, characterised in that it has at least one wire on at least one of its faces, which is axially affixed thereto on a continuous basis.

48. Strip of lattice as claimed in one of claims 46 and 47, characterised in that it has a continuous axial shaping on at least one transverse portion.

49. Method of manufacturing a strip of lattice on a continuous basis by means of a single metal wire, characterised by the following steps:

- winding the metal wire around a shaping drum so that each turn then constitutes an identical motif;
- separating the turns in the direction of the axis of the shaping drum;
- depositing the turns on a shaping plane of the lattice oriented perpendicular to said axis of the shaping drum;
- continuously displacing said plane, in synchronisation with the speeds at which the turns are wound, separated and deposited in order to create an offset between the turns and form the succession of said repetitive patterns of the lattice; and
- welding at least some of the intersection points of said motifs constituting the lattice.

50. Method of manufacturing a strip of lattice on a continuous basis as claimed in the preceding claim, characterised in that, prior to the winding step in

readiness for shaping, the wire is continuously unreeled from a storage reel.

51. Method of manufacturing a strip of lattice on a continuous basis as claimed in one of claims 49 and 50, characterised in that the welding step is followed by a step of cutting the strip of lattice to the desired length.

52. Method of manufacturing a strip of lattice on a continuous basis as claimed in one of claims 49 to 51, characterised in that, if the external wall of the drum has at least one concave portion and/or at least one indentation, the process of shaping by winding around a drum is effected by means of a corresponding number of devices designed to apply the wire against said portion of external wall.

53. Method of manufacturing a strip of lattice on a continuous basis as claimed in one of claims 49 to 52, characterised in that the running of the various steps is automated with the aid of an electronic central unit or a micro-processor equipped with peripheral devices enabling it to be controlled by the user and responding to sensors tracking the progress of the different steps implemented during the course of the method.

54. Method of manufacturing a strip of lattice on a continuous basis as claimed in one of claims 49 to 53, characterised in that the sensors co-operate with the electric motors, making it possible to ascertain their speed and their position at any instant.

55. Method of manufacturing a strip of lattice on a continuous basis as claimed in one of claims 49 to 54, characterised in that at least one metal wire is axially affixed to one of the faces of the strip of lattice on a continuous basis.

56. Method of manufacturing a strip of lattice on a continuous basis as claimed in the preceding claim, characterised in that two or four wires are affixed extending alongside the borders on one or two faces of the strip of lattice.

57. Method of manufacturing a strip of lattice on a continuous basis as claimed in one of claims 49 to 56, characterised in that at least one transverse portion of the strip of lattice is axially shaped on a continuous basis after the motifs have been welded to one another.